Status of the EVM project
- RCN and XDAQ Run Control -

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Current Fermi+MIT Activities

- We have the ”EVM test bench”, which consists of 9 PCs and FastEthernet/Myrinet/IEEE1394 networks.

- RCN study and development (S.P., I.S.)
- XDAQ run control (C.M, S.A.)
- EVB simulation (M.L.)
- XDAQ benchmark test (I.S.)

Development of RCN software

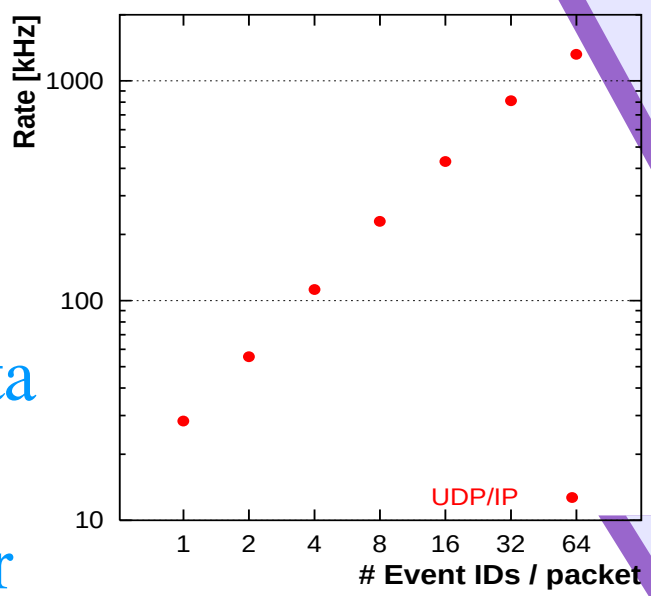
- Reliable broadcast library on Ethernet and IEEE1394
  - UDP/IP on Ethernet - O.K.
  - FCP on IEEE1394 - a bug in packet repairs
  - Iso on IEEE1394 - under development
- Bandwidth and packet drop rate are measured.
- Timing analysis is going on.
- Documents (protocol and library design)
  - http://home.fnal.gov/~ichiro/document/

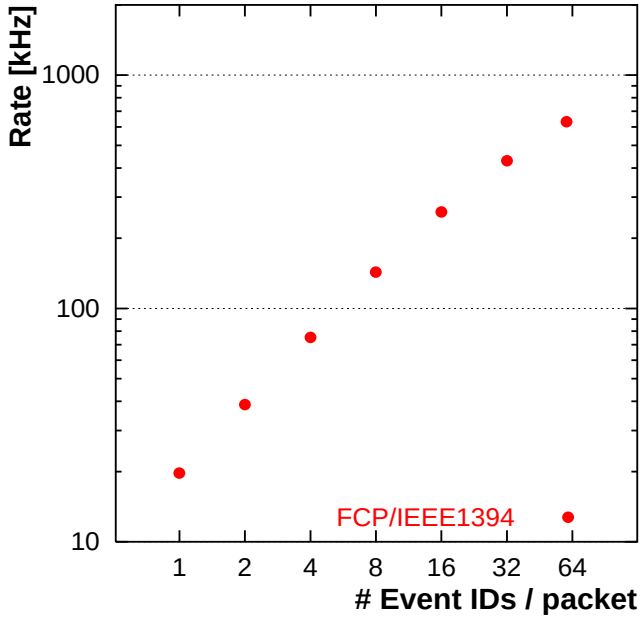
Stability test

- Transmission test of 50000000 packets from one sender to one receiver.
- UDP/IP on Ethernet
  - 8.8 MB/s - 1.1 kHz
  - 8 periods of packet loss, 13000 drops in total
- FCP on IEEE1394
  - 4.3 MB/s - 0.5 kHz
  - no packet loss

Bandwidth vs Packet size

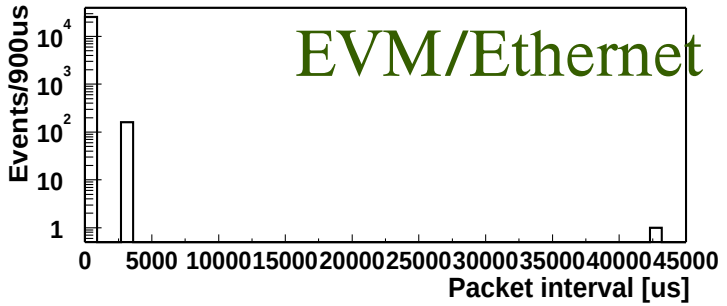
- Test conditions:
  - Two quadlets of Evt-ID data per trigger
  - UDP/IP on FastEthernet or FCP(Async) on IEEE1394
  - No FEC, no transmission error
- Maximum rate:
  - UDP: 1300kHz (10.5MB/s)
  - 1394: 600kHz (5.0MB/s)

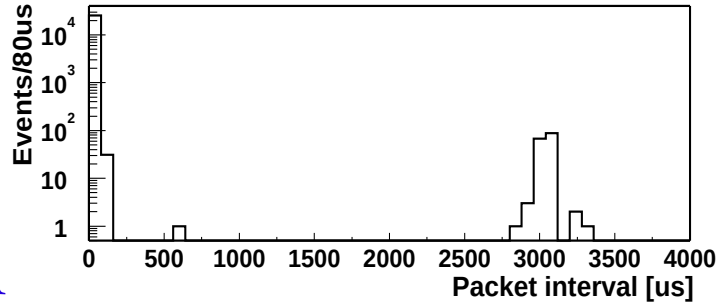


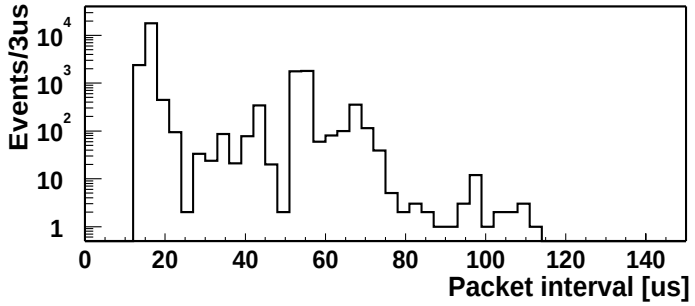


Packet send/receive timing

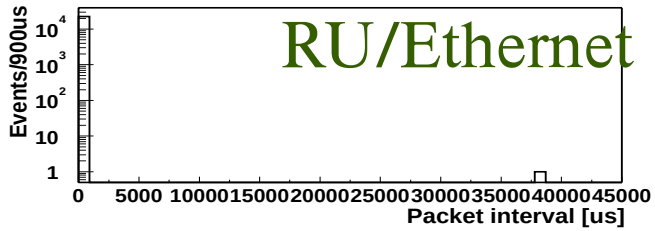
- Distribution of time interval between two consecutive sends or receives
- The jitter of the distribution should be smaller than maximum allowed latency(10ms)

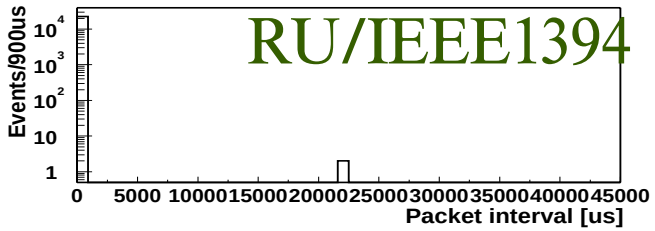


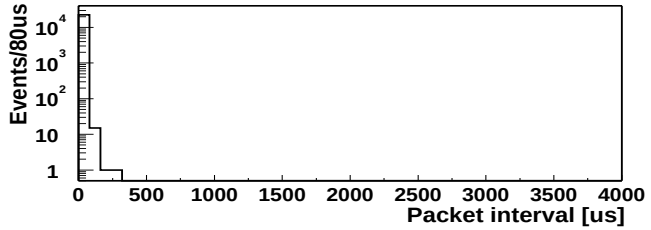


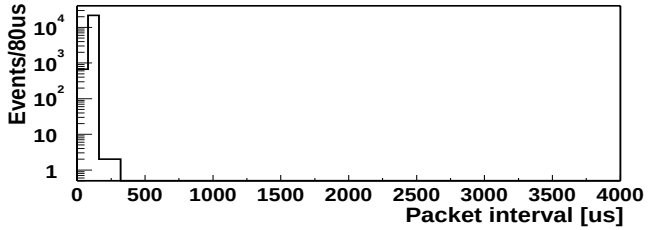


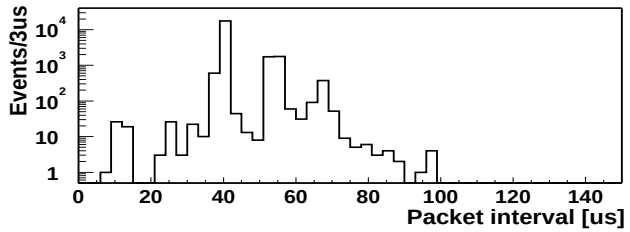
Packet send/receive timing (cont'd)

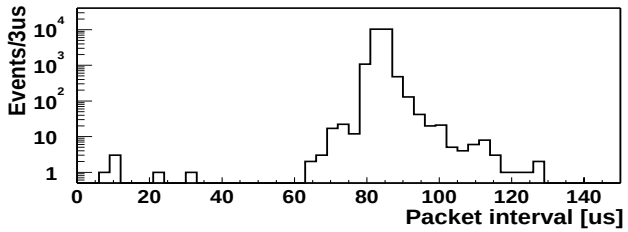








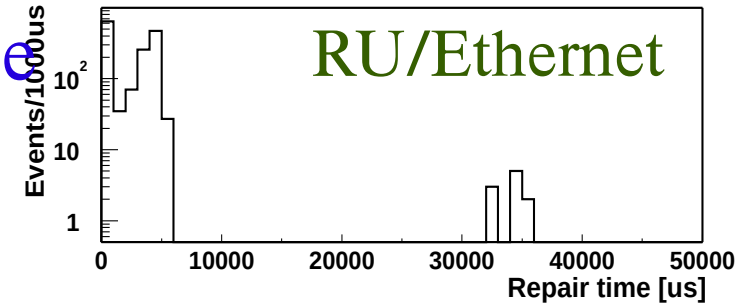


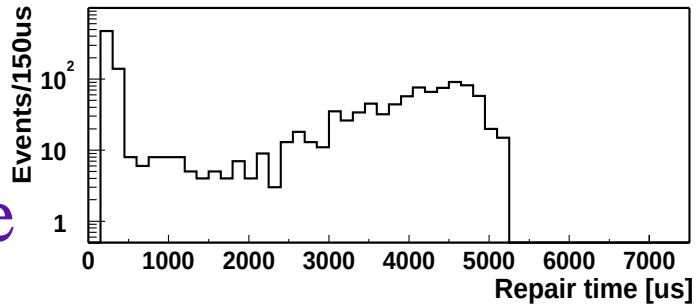


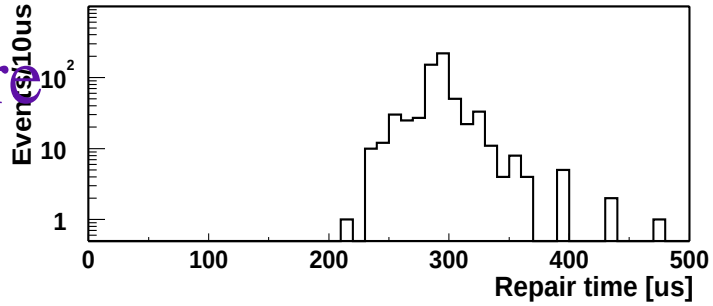
- Most of the events fall inside 150us.
- IEEE1394 is slower but more stable.
- The structures are not yet understood.

Packet repair delay

- Distribution of the time duration taken for packet repairs
- Again, it should be within 10ms.
- Half of the requests are processed within 500us.
- Most of the requests are processed within 5ms.
- The structure is not understood.







Summary on the RCN

- The new reliable broadcast library works with both Ethernet and IEEE1394.
- IEEE1394 showed slower bandwidth than Ether.
- IEEE1394 showed better reliability and timing structure.
- The packet repairs took too long time (5ms), but still acceptable.
- Timing structures are not yet understood.
- Further study/development is necessary.

XDAQ run control

- We need a XDAQ configuration/control tool for benchmark tests and protocol studies.
- Jxdaq on the EVM test bench
  - November and December software releases being used.
  - Working with CERN team to resolve problems w/ Feb. rel.
- XDAQ/XML scripting
  - Working with CERN term to complete the language spec.
  - Implementation will be done by Fermi team w/ CERN team consultation
  - First version will implement basic functionality
    - e.g. ExecSys and DdmSys commands

Future plan on the RCN

- More precise timing analysis of RCN library under various conditions
  - Parameters: # of RUs, Error rate, Ether/1394
  - Non-binomial packet drop probability distribution
- IEEE1394 isochronous transmission
- Integration to the XDAQ (FNAL test bench)

Future Plan on the XDAQ RC

- Short term
  - Extend jxdaq: priority given to implementing minimal XML scripting language.
- Long term
  - Finalize implementation decisions for XDAQ/XML RC
    - e.g. keep Java or choose different language python, C++ ...
  - Design and implementation of GUI based on the final XDAQ/XML